

PATENT COOPERATION TREATY

From the
INTERNATIONAL SEARCHING AUTHORITY

PCT

To:

see form PCT/ISA/220

WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY
(PCT Rule 43bis.1)

Date of mailing
(day/month/year) see form PCT/ISA/210 (second sheet)

Applicant's or agent's file reference
see form PCT/ISA/220

FOR FURTHER ACTION
See paragraph 2 below

International application No.
PCTGB2004/001303

International filing date (day/month/year)
25.03.2004

Priority date (day/month/year)
31.03.2003

International Patent Classification (IPC) or both national classification and IPC
B23P11/00, B23P11/02, F16C23/04, F16C11/06, B21K25/00

Applicant
MINEBA CO. LTD.

1. This opinion contains indications relating to the following items:

- ☒ Box No. I Basis of the opinion
- ☒ Box No. II Priority
- ☒ Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- ☐ Box No. IV Lack of unity of invention
- ☒ Box No. V Reasoned statement under Rule 43bis.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
- ☐ Box No. VI Certain documents cited
- ☐ Box No. VII Certain defects in the international application
- ☐ Box No. VIII Certain observations on the international application

2. **FURTHER ACTION**

If a demand for international preliminary examination is made, this opinion will usually be considered to be a written opinion of the International Preliminary Examining Authority ("IPEA"). However, this does not apply where the applicant chooses an Authority other than this one to be the IPEA and the chosen IPEA has notified the International Bureau under Rule 66.1bis(b) that written opinions of this International Searching Authority will not be so considered.

If this opinion is, as provided above, considered to be a written opinion of the IPEA, the applicant is invited to submit to the IPEA a written reply together, where appropriate, with amendments, before the expiration of three months from the date of mailing of Form PCT/ISA/220 or before the expiration of 22 months from the priority date, whichever expires later.

For further options, see Form PCT/ISA/220.

3. For further details, see notes to Form PCT/ISA/220.

Name and mailing address of the ISA:



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**WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY**

International application No.
PCT/GB2004/001303

Box No. I Basis of the opinion

1. With regard to the **language**, this opinion has been established on the basis of the international application in the language in which it was filed, unless otherwise indicated under this item.
☐ This opinion has been established on the basis of a translation from the original language into the following language , which is the language of a translation furnished for the purposes of international search (under Rules 12.3 and 23.1(b)).
2. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application and necessary to the claimed invention, this opinion has been established on the basis of:
 - a. type of material:
☐ a sequence listing
☐ table(s) related to the sequence listing
 - b. format of material:
☐ in written format
☐ in computer readable form
 - c. time of filing/furnishing:
☐ contained in the international application as filed.
☐ filed together with the international application in computer readable form.
☐ furnished subsequently to this Authority for the purposes of search.
3. ☐ In addition, in the case that more than one version or copy of a sequence listing and/or table relating thereto has been filed or furnished, the required statements that the information in the subsequent or additional copies is identical to that in the application as filed or does not go beyond the application as filed, as appropriate, were furnished.
4. Additional comments:

**WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY**

International application No.
PCT/GB2004/001303

Box No. II Priority

1. ☒ The following document has not been furnished:

☒ copy of the earlier application whose priority has been claimed (Rule 43*bis*.1 and 66.7(a)).

☐ translation of the earlier application whose priority has been claimed (Rule 43*bis*.1 and 66.7(b)).

Consequently it has not been possible to consider the validity of the priority claim. This opinion has nevertheless been established on the assumption that the relevant date is the claimed priority date.

2. ☐ This opinion has been established as if no priority had been claimed due to the fact that the priority claim has been found invalid (Rules 43*bis*.1 and 64.1). Thus for the purposes of this opinion, the international filing date indicated above is considered to be the relevant date.

3. Additional observations, if necessary:

**WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY**

International application No.
PCT/GB2004/001303

Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability

The questions whether the claimed invention appears to be novel, to involve an inventive step (to be non obvious), or to be industrially applicable have not been examined in respect of:

☐ the entire international application,

☒ claims Nos. 9

because:

☐ the said international application, or the said claims Nos. relate to the following subject matter which does not require an international preliminary examination (*specify*):

☐ the description, claims or drawings (*indicate particular elements below*) or said claims Nos. are so unclear that no meaningful opinion could be formed (*specify*):

☐ the claims, or said claims Nos. are so inadequately supported by the description that no meaningful opinion could be formed.

☒ no international search report has been established for the whole application or for said claims Nos. 9

☐ the nucleotide and/or amino acid sequence listing does not comply with the standard provided for in Annex C of the Administrative Instructions in that:

the written form ☐ has not been furnished

☐ does not comply with the standard

the computer readable form ☐ has not been furnished

☐ does not comply with the standard

☐ the tables related to the nucleotide and/or amino acid sequence listing, if in computer readable form only, do not comply with the technical requirements provided for in Annex C-bis of the Administrative Instructions.

☐ See separate sheet for further details

**WRITTEN OPINION OF THE
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International application No.
PCT/GB2004/001303

Box No. V Reasoned statement under Rule 43b/s.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Yes: Claims	1-8
	No: Claims	
Inventive step (IS)	Yes: Claims	1-8
	No: Claims	
Industrial applicability (IA)	Yes: Claims	1-8
	No: Claims	

2. Citations and explanations

see separate sheet

Re Item V

Reasoned statement with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Reference is made to the following documents:

- D1: US-A-2 995 813 (BOARD JR DAVID A) 15 August 1961
- D2: US-A-4 242 784 (MCCLOSKEY ALBERT R) 6 January 1981
- D3: US-A-2 947 063 (TEEPL JR GIFFORD H) 2 August 1960
- D4: US-A-3 068 552 (WILLIAMS ARTHUR H ET AL) 18 December 1962
- D5: DATABASE WPI Section PQ, Week 198652 Derwent Publications Ltd., London, GB; Class P56, AN 1986-344963 XP002281190 -& SU 1 227 839 A (ANISIMOV V N), 30 April 1986

2.1 The document D1 (cf. column 5, lines 19-34, claim 1 and figures) is regarded as being the closest prior art to the subject-matter of claim 1, and shows (the references in parentheses applying to this document):

A method of swaging a spherical bearing comprising a ball (B) and a bearing housing (R), the method comprising the steps of:

- providing a ball (B) and a bearing housing (R) to be swaged around the ball;
- inserting the ball (B) in the housing (R) and
- swaging the housing (R) around the ball (B).

The subject-matter of claim 1 differs from the method described in D1 in the following features:

-creating a temperature differential between the temperature of the housing and the temperature of the ball, the ball being at a lower temperature than the housing such that the relative size of the ball with respect to the housing decreases;

-swaging of the ball around the housing with the ball being cooler than the housing during the swaging process and

-allowing the ball and housing to return to ambient temperature such that the relative size of the ball with respect to the housing increases.

The subject-matter of claim 1 is therefore new (Article 33(2) PCT).

The problem to be solved by the present invention may be regarded as the existence of a gap or at least a non close fit between the ball and the housing, which is created by the spring-back effect. The spring-back effect occurs when the swaging pressure is released from the swaged material (housing), which returns somehow back to its' pre-swaging condition.

The technical effect of the present application is that the ball, in returning to ambient temperature, will undergo thermal expansion, effectively growing with respect to the size of the housing and taking up any spring-back effects latent in the swaged housing, to produce a spherical bearing with a close fit between the ball and the housing.

In document D1 (see column 5, lines 19-34) it is stated that the spring-back effect is compensated by high compression.

In document D2 (see column 4, lines 32-66) additional swaging is used to swage a housing into which a ball has been forcibly inserted.

In document D3 (see column 1, line 43 to column 2, line 6) the spring back characteristics (elasticity) of the housing are taken into account when permitting the housing to spring back after the swaging, thus creating a desired gap.

In document D4 (see column 3, lines 7-16) it is stated that the spring-back effect is compensated by appropriate dimensions of the swaging dies.

In document D5 (see abstract, figures), in order to improve the accuracy of the assembled spherical bearing, a temperature differential is created between the temperature of the housing and the temperature of the ball before the swaging, but contrary to the present application, the ball being at a **higher** temperature than the housing such that the relative size of the ball with respect to the housing **increases**. After the swaging operation the ball is cooled, its' size is reduced, and a predetermined gap is established between the ball and the housing.

The distinguishing features of claim 1 are not suggested in the available prior art. **Hence the subject matter of claim 1 meets the criteria of Article 33(3) PCT regarding inventive step.**

- 2.2** Claims 2-8 are dependent on claim 1 and as such also meet the requirements of the PCT with respect to novelty and inventive step.